# INFLUENCE OF LAND USE DIVERSITY UPON NEIGHBORHOOD SUCCESS: AN ANALYSIS OF JACOBS' THEORY

Charles G. Schmidt *

Abstract

This paper presents an empirical investigation of Jane Jacobs' observations concerning factors generating success within urban neighborhoods. The basic elements of Jacobs' hypotheses of city neighborhood performance are outlined and regression results utilizing Denver as the study area, are presented and compared with findings obtained for Chicago. Additional measures of neighborhood success and failure are introduced in a subsequent canonical correlation analysis to test the overall validity of Jacbos' thesis. In general the empirical analyses provide little supportive evidence for the hypothesized relationships.

## I. Introduction

While the ideas developed by Jane Jacobs in her book The Death and Life of Great American Cities [4] have generated considerable criticism, there have been few systematic analyses of the arguments presented for the success or failure of city residential neighborhoods. Jacobs' call for investigation of her ideas have been largely ignored, although, as has been noted, the hypothesized relationships can be mathematically reformulated and tested realtively easily [7, p. 29]. "I hope any reader of this book will constantly and skeptically test what I say against his own knowledge of cities and their behavior. If I have been inaccurate in observations or mistaken in inferences and conclusions, I hope these faults will be quickly corrected." [4, p. 16] The single empirical analysis of Jacobs' neighborhood success concepts with which this author is familiar was conducted by Weicher on the city of Chicago [7].

The purpose of this paper is to provide an additional empirical test of the theory of successful neighborhoods. Once the basic elements of Jacobs' theory are outlined, the quantitative results of regression analyses for Denver are discussed and compared with Weicher's findings for Chicago. Additional measures of neighborhood success and failure are defined and incorporated into a subsequent canonical correlation analysis. While density is identified in the canonical analysis as a significant factor affecting success (as Jacobs argued), primary diversity appears to have a negative influence upon neighborhood success which is not consistent with the theory.

---

*Assistant Professor, Department of Geography, University of Colorado at Denver.

## II. Neighborhood Success: Definition and Causal Factors

According to Jacobs, success within a neighborhood is defined by the presence of a diversity of activities, and therefore, varied land uses.[1] A successful neighborhood contains a variety of residential, commercial, industrial, educational and recreational land uses [4, pp. 143-46]. "A mixture of uses, if it is to be sufficiently complex to sustain city safety, public contact and cross-use, needs an enormous diversity of ingredients....City diversity itself permits and stimulates more diversity" [4, pp. 144-45]. The presence of a variety of land uses increases the potential attractiveness of the neighborhood for businesses and residents which, in turn, contributes to greater diversity in the socioeconomic make-up of the neighborhood population. Jacobs views diversification of neighborhood populations (income and ethnicity, for example) as critical to successfully 'unslumming slums' [4, p. 286].

Success is defined, alternatively, by the absence of such problems as delinquency, crime, disease, high mortality, and abject poverty. In several chapters Jacobs notes the positive role played by land use diversity in contributing to neighborhood safety, as well as residents' identification with, and commitment to, their neighborhood [4, Chapters 2, 6, and 15]. "A successful city neighborhood is a place that keeps sufficiently abreast of its problems so it is not destroyed by them" [4, p. 112]. The inverse relationship hypothesized between land use diversity and neighborhood failure, therefore, represents a major component of Jacobs' discussion and one that is amenable to empirical analysis.

Jacobs outlines four specific factors that are essential to neighborhood success: 1) diversity of functional uses, 2) short blocks (accessibility), 3) age diversity of buildings, and 4) sufficient concentration of people [4, pp. 150-51]. These factors are viewed as indispensible to viability. "In combination, these conditions created effective economic pools of use....All four in combination are necessary to generate city diversity; the absence of any one of the four frustrates a district's potential" [4, p. 151].

Diversity of land uses is divided into primary and secondary functions. Each successful neighborhood should serve at least one primary function, although more than two is preferred [4, p. 152]. Primary functions or 'anchorages' are those uses that attract people to the neighborhood. These include residences, offices and factories as well as certain recreational and educational activities. Secondary functions are activities that develop to serve the needs of the populace drawn into the neighborhood by primary uses (retail and service

[1] Jacobs emphasizes in the introduction that the observations she makes should not be utilized as guidelines for understanding the processes of success in small towns or suburbs: "Towns, suburbs, and even little cities are totally different organisms from great cities. We are in enough trouble already from trying to understand big cities in terms of the behavior, and the imagined behavior, of towns. To try to understand towns in terms of big cities will only compound confusion" [4, p. 16].



functions). "The more intricately mixed, and therefore efficient, the pools of users are, the more services and shops there can be that need to sift their clienteles from all sorts of population, and in turn the more people are drawn" [4, pp. 162-63].

Short or small blocks that facilitate greater numbers of paths for travel are also necessary to minimize social and economic isolation or fragmentation within the neighborhood: "...frequent streets and short blocks are valuable because of the fabric of intricate cross-use that they permit among the users of a city neighborhood....The means by which they work (attracting mixtures of users along them) and the results they can help accomplish (the growth of diversity) are inextricably related. The relationship is reciprocal" [4, p. 186]. Short blocks and frequent opportunities to turn corners increase accessability for users of secondary functions, provide potential for growth of uses throughout the neighborhood, and encourage interaction of the residents.

Neighborhood building stock that varies in age and condition is yet another generator of success. Age diversity of buildings increases the opportunities for a variety of businesses to obtain less expensive space and, therefore, further contributes to the potential for development of primary and secondary diversity [4, pp. 187-90]. "A successful city district becomes a kind of ever-normal granary so far as construction is concerned. Some of the old buildings, year by year, are replaced by new ones--or rehabilitated to a degree equivalent to replacement. Over the years there is, therefore, constantly a mixture of buildings of many ages and types" [4, p. 189].

Finally, a sufficient concentration of people, including residents, is identified as a requisite for success. A minimum threshold population is necessary to maintain the viability of businesses creating secondary diversity. Noting that densities up to 20 dwelling units per net residential acre are associated with successful suburbs [4, p. 209], but 20 to 100 units are too high for suburbs and too low to stimulate diversity, Jacobs argues that densities over 100 dwelling units per net residential acre are conducive to neighborhood success [4, p. 212]. Thus, neighborhood failure increases up to 100 dwelling units and declines thereafter.

## III. Mathematical Reformulation and Data Description

In order to empirically test the relationships hypothesized by Jacobs, and to insure comparability of the statistical results reported for Chicago, the symbols and variables employed in this section of the analysis follow as closely as possible those developed by Weicher [7]. Given that

$F$ = neighborhood failure as measured by high crime and disease rates[2]
$D$ = total diversity of land uses
$D_p$ = diversity of primary uses

[2] Given the nature of the indicators, the model is expressed in terms of failure rather than success [see 7, p. 32].

B = average acreage per block
R = diversity or variation in building age
H/A = density of housing units per net residential acre

and since

$F = f(D)$, and $D = [D_p, B, R, H/A, (H/A)^2]$

then $f = f[D_p, B, R, H/A, (H/A)^2]$.

Because Jacobs argues that neighborhood failure increases with density up to densities of 100 units per net residential acre and declines thereafter, both H/A and $(H/A)^2$ are included in the analysis [7, pp. 32-33].

Data to test the relationships posited by Jacobs for the City and County of Denver were obtained from a study conducted by the Denver Planning Office [5]. Socioeconomic and land use data were compiled by neighborhoods for 1960 and 1970. These neighborhoods consist of socioeconomically similar and contiguous census tracts, utilized as planning areas, which appear to correspond most closely to the neighborhood conceptualized by Jacobs [see 5, pp. B-3 to B B-5]. The 1970 data on land use, density, housing, crime, and disease were utilized for the empirical analysis. In attempting to develop measures consistent with the Chicago study [7], only two comparable measures of failure were available by neighborhood: crime and disease per 1000 persons. These measures of failure will be compared with the results obtained in Weicher's analysis of delinquency and death rates respectively. Indeed, Weicher notes the desirability of using crime and disease rates in calling for additional empirical research on neighborhood success [7, p. 39].

The measures of primary and total diversity were based on the percentage distributions of land use by neighborhood. Primary diversity ($D_p$) was defined as a product of the percentages of land devoted to industrial and residential uses. Similarly, total diversity (D) was defined as the product of the percentages among five types of land use: residential, industrial, commercial, parks and public). The more equal the percentage distributions of land use, the higher the index will be (i.e., the greater the primary or total diversity).[3] Jacobs

[3]The measures of primary and total diversity are identical to those utilized by Weicher. Alternative measures of total and primary diversity were also tested: 1) coefficient of specialization (comparing the sum of the positive or negative percentage differences for each neighborhood by land use category relative to the Denver average; and (2) variance of land uses ($\sigma^2$). However, the regression results were consistently poorer than those obtained utilizing the product of land use percentages and these alternative measures were abandoned. In addition, since the data for Denver neighborhoods also included distinctions between single family and multiple family units, an alternative measure of primary diversity was tested: (% single family) x (% multiple family) x (% industrial land. Once again, however, the regression results were consistently poorer than those obtained utilizing the two-category primary diversity index.



observes that certain uses may be primary in one neighborhood and secondary in another. The uncertainty as to whether a particular type of land use is primary or secondary in a neighborhood presents difficulties in empirical analysis. However, as Weicher also notes for Chicago [7, p. 34], since such a large portion of the land in Denver is devoted to residential and industrial uses (73%), the necessarily arbitrary designation of all other uses as secondary should not unduly distort the indices of primary diversity for each neighborhood [5, p. D-2].

As in the case of Chicago, the Denver data did not include ages for all structures. As a surrogate measure, the age diversity of residential structures (R) was adopted, and defined as the product of the percentages of residential units constructed before 1940, 1940-49, 1950-59, and 1960-70.[4] Average block size (B) was computed by dividing the total area within the neighborhood by the number of blocks. Household density (H/A) was obtained directly from the Denver Neighborhood Analysis [5] and defined as the total number of dwelling units per net residential acre. The measures of block size and density also correspond to those in the Chicago study [7, p. 35].

## IV. Comparative Analysis of Regression Results

Multiple linear regression analysis was performed on the Denver data and the results are recorded in Table I along with the findings obtained by Weicher.[5] Data for 68 of the 73 neighborhoods are included in the Denver analysis. The CBD and Stapleton Airport areas as well as several other industrial or military districts were eliminated since they were clearly nonresidential neighborhoods and, therefore, not applicable for testing Jacob's theory.

Regressions #1 and #2 indicate that the measures of failure increase as total diversity increases, contrary to the relationships suggested by Jacobs. The coefficients are statistically significant at the .05 level and are in agreement with the findings for Chicago. It appears that land use diversity does not generate neighborhood success.

Regression #3 presents the relationship between total land use diversity and the four factors hypothesized as creating it. The analysis provides some support for the observations made by Jacobs. Primary diversity and age diversity are significantly and positively related to total diversity as predicted. However, larger block size is positively correlated; Jacobs predicted and inverse relationship. Similarly, the relationship between diversity and density is contrary to the hypothesis, although neither coefficient is significantly

[4]Weicher's age diversity index included only two categories: residences built prior to 1940 and those constructed between 1940 and 1959 [7, p. 35].

[5]Regression results obtained from the logarithmic transformation of variables are reported. The nonlog regression analyses were essentially the same, with no difference in the number of statistically significant regression coefficients obtained and minimal differences in the coefficients of determination.

TABLE I

REGRESSION ANALYSES OF NEIGHBORHOOD FAILURE

| | Study Area | Dependent Variable | Constant | D | $D_p$ | B | R | H/A | $(H/A)^2$ | $R^2$** |
|---|---|---|---|---|---|---|---|---|---|---|
| (1) | Denver | Crime | 1.440 | .062* | -- | -- | -- | -- | -- | .056 |
| | Chicago | Delinquency | 18.78 | .051* | -- | -- | -- | -- | -- | .278 |
| (2) | Denver | Disease | -.719 | .027* | -- | -- | -- | -- | -- | .123 |
| | Chicago | Death | 92.10 | .045* | -- | -- | -- | -- | -- | .121 |
| (3) | Denver | Total Diversity | -.656 | -- | .639* | 3.39* | .174* | 6.21 | -3.09 | .507 |
| | Chicago | Total Diversity | 83.61 | -- | -.87 | -5.68 | .500 | 9.50* | -.056 | .403 |
| (4) | Denver | Disease | -1.604 | -- | .180* | .336 | .084* | -101.9 | 51.3 | .516 |
| | Chicago | Death | 71.12 | -- | -.102 | .143 | .434 | 1.55 | -.009* | .529 |
| (5) | Denver | Crime | 1.06 | -- | .062 | -.09 | .002 | 188.3 | -93.8 | .511 |
| | Chicago | Delinquency | 9.68 | -- | -.038 | .018 | -.11 | .777* | -.002 | .590 |

Sources: Chicago--Weicher [7, Table 3, p. 36]; Denver--author.
*Significant at the .05 level. Note that Weicher tested several coefficients at different levels of significance than those recorded in this table [7, pp. 36-37].
**Coefficient of determination.

different from zero.[6] Total land use diversity decreases with high density and increases at low densities. The relationships between age diversity, density and total diversity are similar to those in Chicago.

Regressions #4 and #5 record the observed relationships between neighborhood failure (disease and crime respectively) and the generators of success. Only a few of the coefficients are statistically significant and possess the predicted sign. In the disease regression, both primary diversity and age diversity have the predicted sign and are statistically significant. Block size and the density measures are not significant and only the block size measure exhibits the predicted relationship. The crime regression for Denver lends even less support for Jacobs' theory. None of the coefficients are significantly different from zero and only the density measures have the correct sign.

Overall, a comparison of the disease and crime regressions for Denver with the death and delinquency regressions for Chicago furnish empirical

[6]The multicollinearity between density and square of density (r = .95) does not bias the coefficients, although the standard errors are increased [see 7, p. 38].



evidence that does not support the general hypotheses developed by Jacobs.[7] Weicher noted that none of the independent variables seem to have a consistent influence on diversity or failure [7, p. 37]. Similarly, the Denver neighborhood data reveal few uniform effects. Density (both density and the square of density) is insignificant in both regressions of failure and the total diversity regression. Total diversity, while significantly related to both measures of failure, exhibits a positive relationship contradictory to Jacobs' hypothesis. Likewise, age diversity and primary diversity are positively related to failure and statistically significant only when measured against disease rates. Block size is insignificant when analyzed in the failure regressions, but is positively and significantly related to total diversity (in agreement with Jacobs).

## V. Canonical Correlation Analysis

While the regression analysis results provide minimal evidence for the validity of Jacobs' observations, it could be argued that 1) other measures of failure might more clearly indicate the influence of land use diversity on neighborhood performance, or 2) a number of failure or success measures analyzed simultaneously would reveal more significant relationships. However, multiple regression analysis does not permit the investigation of several dependent and independent variables simultaneously in order to answer the major research question: Do land use diversity and density exert significant influences upon neighborhood success as measured by a set of performance indicators?

One technique utilized by researchers for investigating the relationship(s) between a set of dependent (criteria) and independent (predictor) variables is canonical correlation analysis.[8] Developed by Hotelling in 1935 [2, p. 35], canonical correlation analysis derives a linear combination from each of two variable sets such that the correlation between them is maximized [3, pp. 132-37 and 6, pp. 515-18]. Each linear pair, or canonical variate, is similar to the principal component derived from principal components analysis, although the selection criterion is different. "Whereas both techniques produce linear combinations of the original variables, canonical correlation analysis does so not with the object of accounting for as much variance as possible within one set of variables but with the aim of accounting for a maximum amount of the relationship between two sets of variables" [6, p. 517].

Several pairs of linear combinations may be derived. The canonical correlation technique selects the first pair of canonical variates that maximizes

[7]Weicher also analyzed age-adjusted admission rates to mental institutions against generators of neighborhood success. None of the coefficients were significant (at the .05 level), with the density and primary diversity coefficients exhibiting the correct sign [7, pp. 36-37].

[8]See Bolch and Huang [1, pp. 250-59] or Harris [3, Chapter 5] for a detailed mathematical treatment of canonical correlation analysis.

the intercorrelation between the two sets of variables. Subsequent sets of canonical variates are selected that account for the maximum amount of residual variance, that is, the variance not explained by the previous canonical variates. The degree of correlation between corresponding pairs of canonical variates is the canonical correlation (R). The square of the canonical correlation indicates the amount of variance in one canonical variate accounted for by the other variate [6, p. 517].

When a researcher is interested in analyzing the relationships between a large number of variables, factor analysis is a commonly utilized technique. However, unlike regression or canonical correlation, factor analysis does not distinguish between dependent and independent variables. One possibility is to divide the set of data into dependent and independent variable sets and perform a factor analysis on each, and then perform a correlation or regression analysis on the smaller set of factors generated. But "...if there is more than one factor that is meant to be dependent...the use of regression becomes problematic" [6, p. 516]. Therefore, in attempting to analyze the relationships between the set of predictor variables (generators of neighborhood success) and criterion variables (neighborhood performance), canonical correlation analysis is utilized.

## VI. Empirical Results of Canonical Analysis

In analyzing the relationship between neighborhood success or failure and diversity, the specific measures utilized previously were employed as the set of predictor variables. In addition to the crime and disease rates, three additional measures of neighborhood failure were included in the dependent variable set: 1) population stability (percent of the population that changed residence within the 1965-70 period); 2) income diversity (product of the percentages of families in several income groups); and 3) percent of vacant land in each neighborhood.

The population mobility measure is utilized to represent the stability of a neighborhood that Jacobs also cites as being a significant indicator of success [4, pp. 114 and 139]. Over time, residents experience changes in jobs, income, family size, as well as tastes and preferences. "If they live in diversified rather than monotonous districts--in districts, particularly where many details of physical change can constantly be accommodated--and if they like the place, they can stay put despite changes in the locales or natures of their pursuits or interests" [4, p. 139]. Jacobs hypothesizes an inverse relationship between diversity and frequency of moves, that is, greater diversity will enhance stability and result in a lower percentage of the neighborhood residents that move.

As a measure of economic success, an income diversity index was included. In several instances Jacobs identifies the diversity of income groups within a neighborhood as a measure of success and the large concentration of poor as an indication of failure. A direct relationship is hypothesized to exist between diversity of uses and family income diversity [4, p. 286]. ; The family income diversity index is defined as the product of the percentage of neighborhood families in each of six income ranges. The greater the diversity of



income groups, the higher the index.[9]

Finally, vacant land is suggested by Jacobs as an indicator of neighborhood performance. Land vacancy reflects the absence of potential generators of employment and diversity, as well as the weakening of street safety [4, Chapter 2]. "No more stores, no more activity generated by the stores, almost no more pedestrians crossing--and no more watchers" [4, p. 37]. As an indicator of this deterioration and failure, the percent of vacant land in each neighborhood is also employed in the analysis.

The results from the canonical correlation analysis are recorded in Table II.[10]

TABLE II

CANONICAL ANALYSIS OF NEIGHBORHOOD PERFORMANCE AND GENERATORS OF SUCCESS

| | 1 | 2 | 3 | 4 | 5* |
|---|---|---|---|---|---|
| $R^2$ | .8094 | .6477 | .2433 | .1600 | .0160 |
| $R_i$: | .8997 | .8048 | .4933 | .4000 | .1250 |
| Crime | .331 | -.486 | -.513 | | |
| Disease | -.006 | -.420 | -.762 | | |
| Instability | -.050 | -.597 | .427 | | |
| Vacant Land | -.812 | .014 | -.636 | | |
| Income Diversity | .162 | .017 | -.771 | | |
| Age Diversity (R) | .010 | -.051 | -.608 | | |
| Block Size (B) | -.898 | -.625 | -.283 | | |
| Low Density (H/A) | .523 | -2.545 | -1.219 | | |
| High Density [$(H/A)^2$] | -.382 | 1.695 | 1.529 | | |
| Primary Diversity ($D_p$) | .027 | -.104 | -.562 | | |

*Coefficients have been omitted since $R^2$ is not statistically significant at the .05 level.

[9] Note that unlike the other measures of neighborhood performance, this index, by necessity, records evidence of success rather than failure. Family income ranges (annual) included: $0-3999, 4000-5999, 6000-7999, 8000-9999, 10000-14999, and 15000+. Other measures reflecting economic failure such as percent of families below the poverty level were substituted in several additional canonical analyses. These measures, however, produced minimal changes in the canonical correlations and no change in the overall relationships between success and diversity.

[10] The analysis was undertaken utilizing the BMDO9M canonical correlation program. The correlation matrix was employed in making the computations.

Statistical tests indicate that the first three canonical correlations are significant at the .05 level.[11] In other words, there are three significant ways in which the two domains are related [2, p. 43]. The results suggest that neighborhood success is influenced by the predictor variables, but not necessarily in the manner hypothesized. The first pair of canonical variates indicates that neighborhoods with high internal accessability (small blocks) reflect evidence of income diversity and low vacancy rates (as predicted) but high crime. The second pair of variates identifies high density neighborhoods that have experienced neighborhood success as measured by three of the indices (little crime, disease or instability). The third and final pair of significant variates reveals that neighborhoods of high density, but specialized primary land use and age uniformity (absence of age diversity), exhibit mixed performance. These areas are relatively unstable and lack income diversity, but are districts of low crime, disease and land vacancy.

Over 90% of the variation in the neighborhood failure measures are accounted for by the set of predictor variables included in the three significant pairs of canonical variates. Block size appears, at best, to have a mixed influence on the success of neighborhoods as indicated by 1) the inverse relationship between block size and crime (opposite of Jacobs), 2) no discernible influence of block size on stability or disease, but 3) the predicted influence of small block size on income diversity and land vacancy. Clearly, the relationship between higher density neighborhoods and the absence of crime, disease or instability as recorded in the second pair of variates lends the most credence to Jacobs' observations. Finally, the impacts of primary diversity and age diversity in neighborhoods of higher density suggest a relationship in conflict with the overall hypothesis. Specialized land use and age-uniform neighborhoods of higher density experienced little crime or disease and less vacant land.

## VII. Summary and Conclusions

In general, the hypothesized relationship between the set of neighborhood failure measures and generators of success was not substantiated. While several factors appear to have influenced neighborhood success, there was little evidence obtained from the canonical analysis to show that successful neighborhoods included <u>all</u> of the conditions deemed necessary for generating success.

---

[11] Cooley and Lohnes [2, p. 37] and Whitla [8, p. 125] outline procedures for testing the overall significance of the null hypothesis and individual pairs of canonical variates or roots ($r^2$). Defining lambda ($\Lambda$) as $\Lambda = \prod (1-r_i^2)$, then the chi-square approximation for the distribution of lambda provides a test for the null hypothesis that the predictor variates (p) are not related to the criteria variates (q): $\chi^2 = [(N-1) - .5(p+q+1)]\ln\Lambda$, with (p)(q) degrees of freedom. If the null hypothesis can be rejected, the contribution of the first and subsequent roots to lambda can be removed and the significance of q-r roots are tested with (p-r)(q-r) degrees of freedom.



Of equal importance, the empirical relationship identified between primary diversity and success did not support a major tenet articulated by Jacobs.[12] Similarly, the comparison of multiple regression analyses for Chicago and Denver provided evidence that refuted the majority of the predicted influences of diversity upon neighborhood performance. Despite any differences in zoning, building regulations, and quality of public services that may exist between Denver and Chicago, the regression results indicated consistent disagreement with Jacobs' hypotheses.

This study sought to 1) develop a set of measures consistent with those utilized by Weicher so that comparisons of research findings could be made, and 2) expand the number of neighborhood failure measures in testing Jacobs' theory of successful neighborhoods. Alternative measures of diversity and failure produced poorer statistical results than the indices reported in the analysis. The land use categories were identified as entirely primary or secondary in each neighborhood, with no allowance being made for certain uses functioning as primary in one area and secondary in another. It would be worthwhile to identify these functional variations, whenever possible, in developing indices to be tested in other cities. Refinement of the age diversity measure deserves further attention as well. In this study the age diversity index was based on residential structures only and may not have truly reflected the diversity that Jacobs emphasized as affecting success.

Neighborhood income diversity, population stability, crime, disease, and vacant land were employed as indicators of failure or success. Clearly, the identification of other measures of failure would be useful in testing the relationship between diversity and success in neighborhoods for other cities. For example, Jacobs stresses the influence of resident participation and interest in the political processes within neighborhoods as a measure of success [4, p. 133]. The number of neighborhood political clubs, business associations, or improvement groups could be a useful indicator of this interest and commitment.[13] Similarly, annual neighborhood investment (housing or business construction) or economic growth (income or employment changes) could be utilized as measures of neighborhood success.

---

[12] A number of additional canonical correlation analyses were carried out. The deletion of different failure measures and the testing of these combinations against the set of predictor variables was undertaken to 1) identify any other significant or readily interpretable relationships, and 2) substantiate the relationships discussed above. The positive influence of higher density, and the negative influence of primary diversity, upon neighborhood success were consistently identified in these tests.

[13] As a surrogate measure, the percent of the population registered to vote in each neighborhood of Denver was included in a canonical correlation analysis. Inclusion of this measure of 'political participation,' however, did not provide any clearly interpretable results and this variable was deleted from subsequent analyses.

The complexity of forces operating within urban neighborhoods suggests the desirability of considering neighborhood performance over time. Neighborhood failure or success is the product of on-going economic, social, and political processes. Examination of the relationships between changes in neighborhood performance measures and generators of success may provide greater supportive evidence for Jacobs. Such analyses may also aid in the development of key indicators that might serve as guidelines for coordinated neighborhood development programs or policies.

Land use planning decisions, building or zoning codes, as well as the quality of public services (e.g., police protection) may also exert considerable influence upon neighborhood performance. The relationships hypothesized by Jacobs may be correct, or most applicable, within areas where 'free market forces' dominate or where selected land use controls are least stringent. Indeed, Jacobs emphasized the adverse impacts of public planning upon neighborhood success, arguing for planning agencies or policies that maximize neighborhood decision-making flexibility:

> ...most city diversity is the creation of incredible numbers of different people and different private organizations, with vastly different ideas and purposes, planning and contriving outside the formal framework of public action. The main responsibility of city planning and design should be to develop --insofar as public policy and action can do so--cities that are congenial places for this great range of unofficial plans, ideas and opportunities to flourish, along with the flourishing of the public enterprises [4, p. 241].

Identification of relationships between neighborhood success and various land use policies would, therefore, assist in determining the validity of Jacobs' hypotheses and the effectiveness of planning regulations or policies.

Given that Jacobs' theory can be formulated and treated mathematically with relative ease, it would be worthwhile to investigate these relationships within cities that vary in size, age, quality of public services, and land use controls. As Weicher observes, Jacobs' theory may only be applicable to larger, older, and higher density eastern U.S. cities [7, p. 39]. Regardless of whether the results of such studies support Jacobs' theory, the ideas set forth represent a useful foundation upon which the identification of the causal factors accounting for neighborhood success may be developed.

## REFERENCES


1. Bolch, B. W. and Huang, C. J. (1973), Multivariate Statistical Methods For Business and Economics, Englewood Cliffs: Prentice Hall.
2. Cooley, W. W. and Lohnes, P. R. (1962), Multivariate Procedures for the Behavioral Sciences, New York: Wiley.
3. Harris, R. J. (1975), A Primer of Multivariate Statistics, New York: Academic Press.
4. Jacobs, J. (1961), The Death and Life of Great American Cities, New York: Random House.
5. Vokac, D. (1972), Denver Neighborhood Analyses, Denver Planning Office: Community Renewal Program.
6. Warwick, P. V. (1975), "Canonical Correlation Analysis," in Nie, N. H., et al (eds.), Statistical Package for the Social Sciences, New York: McGraw Hill.
7. Weicher, J. C. (1973), "A Test of Jane Jacob's Theory of Successful Neighborhoods," Journal of Regional Science, Vol. 13, No. 1, pp. 29-40.
8. Whitla, D. K. (1968), Handbook of Measurement and Assessment in Behavioral Sciences, Menlo Park: Addison-Wesley.

# THE ANNALS OF REGIONAL SCIENCE

*Editor*

MICHAEL K. MISCHAIKOW

*Editorial Committee*

JAMES R. ALBERS
Huxley College of Environmental Studies

JAY C. ANDERSEN
Utah State University

FRED E. CASE
University of California, at Los Angeles

JEANNE DOST
Oregon State University

MICHAEL A. GOLDBERG
University of British Columbia

PAULO ROBERTO HADDAD
Universidade Federal De Minas Gerais — Brazil

DOUGLAS N. JONES
Library of Congress

RICHARD Y.P. JOUN
Hawaii's Department of Planning and Economic Development

HERBERT KARIEL
University of Calgary

JACK L. KNETSCH
Simon Fraser University

JACK W. OSMAN
San Francisco State University

RICHARD E. PETERSO
University of Hawaii

BERTRAND RENAUD
World Bank

GUNTER SCHRAMM
University of Michigan

LARRY D. SINGELL
University of Colorado

W. ED WHITELAW
University of Oregon

*Book Reviews Editor*

ROGER L. BURFORD
Lousiana State Universtiy


**The Annals of Regional Science**, a periodical in the emergent interdisciplinary field Regional and Urban studies, brings to the interested reader, in addition to scholarly articles, results of recent research ranging over resource management, location of economic activiti regional and urban planning transportation, and environment quality. The editorial and financ responsibilities rest with the editor.

Submission of manuscripts for possible publication are welcome. For conditio governing such a submission, please refer to "Information for Authors" printed on the ba of this issue.

Publications submitted for review should be sent to Dr. Roger L. Burford, Bo Reviews Editor, **The Annals of Regional Science**, Department of Quantitative Metho College of Business Administration, Louisiana State University, Baton Rouge, LA 70803.

All other correspondence including manuscripts should be addressed to: **The Annals Regional Science**, College of Business & Economics—W.W.S.C., Bellingham, WA 98225 U.S.


Library of Congress
Catalog Card Number
68-66-304

Printed in the U.S.A. by Union Printing Company, Bellingham, Washington


# THE ANNALS OF REGIONAL SCIENCE

*Editor*

MICHAEL K. MISCHAIKOW


VOL. XI March 1977 No. 1





*Published in cooperation with*

The Western Regional Science Association
and
Western Washington State College